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Appl. No.: 10/709,677
Amdt. Dated: 10/17/2006
Reply to Office action of: 08/10/2006

AMENDMENTS TO THE DRAWINGS:

There are no amendments to the drawings being presented herewith.

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REMARKS/ARGUMENTS

Claims 1 – 19 remain in this application. Claims 1 – 11 have been amended to more clearly define the claimed invention.

No new matter has been introduced by these amendments.

Claims 1 – 19 were rejected under 35 U.S.C. 103(a) as being unpatentable over Kim (US 5,867,007), in view of Lofty (US 5,850,351), and in further view of Miller (US 2005/0017654). Specifically, the Examiner states:

> Kin discloses an electrical system where the voltage of the first battery is lower than the second battery, a module, and a DC/DC converter (figure 2; column 1, line 63 to column 2, line 4; column 3, lines 56 – 64). Kim discloses that the batteries are provided with an automatic disconnection device (figure 2, items 611, 612, 631, 632; column 4, lines 20 – 22). The monitoring module disclosed by Kim is listed as a "smart battery circuitry". The smart batter circuitry comprises a voltage detector (figure 2, item 300; column 4, lines 32 – 51) that compares the voltage at the posts of the batteries to a preset level. In the event that the voltage level drops below the set level, the microcontroller (figure 2, item 500) of the smart battery circuitry emits a signal to trigger the switches of the automatic disconnection device.
>
> Kim does not expressly disclose a communications network, the second battery is connected to a generator, and a plurality of loads that each comprise power distribution units.
>
> Regarding the communications network, Lofty discloses a dual battery system, where each battery contains a monitoring module (figure 1, items 11, 12; column 2, lines 30 – 32). The modules include a microcomputer, and monitor electronic characteristics of the battery (column 2, lines 47 – 49). The microcomputers of each module communicate with each other through a data network (figure 1, item 15; column 2, lines 34 – 38).
>
> Kim and Lofty are analogous because they are from the same field of endeavor, namely battery monitoring modules. Further, Kim and Lofty disclose a multiple battery electrical system, where each battery includes a

microcontroller for monitoring performance characteristics of the battery.

At the time of the invention by applicants, it would have been obvious to a person of ordinary skill in the art to combine the electric source circuitry disclosed in Kim with the battery data network disclosed in Lofty.

The motivation for doing so would have been to create a battery selection circuit for devices with dual batteries.

Regarding the second battery connection to a generator and power distribution units within the loads, Miller discloses a dual voltage electrical load system. The system includes high-voltage and low-voltage power sources (paragraphs 3 – 4) of an automobile that are connected to a generator. Miller discloses a plurality of loads (paragraph 16; figure 1, item 17 – 19), where each load comprises a power distribution unit (figure 1, items 14 – 16). The power distribution units maintain an average output voltage that is within the accepted range for each load.

Kim, Lofty, and Miller are analogous because they are from the same field of endeavor, namely, electronic distribution systems. Further, Miller is designed for use in a dual voltage electrical automotive system.

At the time of the invention by applicants, it would have been obvious to a person of ordinary skill in the art to combine the electric source circuitry disclosed in Kim and the data network disclosed in Lofty with the power distribution units disclosed in Miller.

The motivation for doing so would have been to create a smart circuitry that could detect the proper voltage levels at the source and distribute the power appropriately to the loads.

With respect to claim 2, Kim, Lofty and Miller disclose the system according to claim 1. Lofty further discloses that the communications network N is a dedicated network (figure 1, item 15; column 2, lines 34 – 38).

With respect to claim 3, Kim, Lofty and Miller disclose the system according to claim 1. Lofty further discloses that the communications network N is a shared bus, such as a CAN bus. The common data bus disclosed in Lofty is a bus that is shared among the components of the system, thereby meeting the limitations of claim 3.

With respect to claim 4, the claim is rejected as discussed above in the rejection of claim 1. There is no disclosure I the specification that distinguishes the measurements of the State of Health (SOH) and the State of Charge (SOC) of the battery B1, as recited in claim 4, from the measurements of the sensed voltage and current of battery B1, as recited in claim 1.

With respect to claim 5, Kim, Lofty and Miller disclose the system according to claim 1, and further disclose the module SMM or control node CN is included in an assembly for the control and management of all or part of the loads fed by said battery B1. Kim and Lofty, as discussed above, disclose that battery B1 includes a module SMM for monitoring and controlling the output of the battery B1. Further, this module SMM is included in an *assembly of components,* which includes the power distribution units and loads of Miller. Therefor, the references cited above combine to disclose the limitations of claim 5.

With respect to claim 6, Kim, Lofty and Miller disclose the system according to claim 1. Miller discloses said power distribution units (10), (20), (30) to the loads (12), (22), (23), (32), (33) controlled by a microcontroller (10a), (20a), (30a), supply loads (22), (32) of said sector, at a lower voltage level, fed from battery B1, said microcontrollers (23a), (33a) supply loads (23), (33) included in said higher-voltage-level sector fed by said battery B2. Miller discloses that system is for use in a dual-voltage electrical automotive system (paragraph 17, lines 8 – 10). Miller also discloses that any type and any number of bulb loads may be used with the power distribution units (paragraph 16, lines 6 – 17).

It would be obvious to a person of ordinary skill in the art to adjust the power distribution units according to its associated load. Further, it would be obvious that some of the loads may require one of the high or low voltages in the dual voltage electrical automotive system. The power distribution units configured to the supply the high-voltage loads from the high-voltage battery would inherently be in a different group than the power distribution units configured to the supply the low-voltage loads from the low-voltage battery (Miller, paragraphs 3 – 4).

With respect to claim 7, Kim, Lofty and Miller disclose the system according to claim 6. Miller further discloses said loads (23), (33) are governed by power switches(23a),(33a)controlled by said corresponding microcontroller (20a), (30a) of said power distribution unit (paragraph 16, lines 2 – 5). The register (13), by activating the proper power distribution unit (bulb drivers 14 – 16), of Miller can selectively apply and/or remove power from each of the loads. It is obvious in the disclosure of Miller that the on/off signal transmitted by the power distribution units would activate a switch within the bulb to execute the command.

With respect to claim 8, Kim Lofty and Miller disclose the system according to claim 7, and further, it would have been obvious to use a field effect transistor (FET) as the switch. It is well known in the art to use FETs as switching devices.

With respect to claim 9, Kim, Lofty and Miller disclose the system according to claim 7. Miller discloses said power distribution units (10), (20), (30) comprise in cooperative combination said power switches (23a), (33a) and said respective microcontroller(20a), (30a) sensing the voltage or impedance at the output of said power switches (23a), (33a) prior to said controlledload(23),(33), allowing avoidance of connectiontosaidmirocontrolled load (23), (33) where said values are output of predeterminedvalues(paragraph 16). Miller discloses that the power distribution units can activate the loads to optimize low-peak currents (lines 10 – 15). It is obvious that the power distribution units would access the operability of each load prior to activating the load. The PDUs would do so in order to prevent a load operating outside of an acceptable margin from overloading the system.

With respect to claim 10, Kim, Lofty and Miller disclose the system according to claim 1. Lofty discloses each one of said batteries B1 and B2 is provided module SMM microcontroller for controlling at least a disconnection device (SDB) of said batteries (column 2, lines 30 – 32 and 47 – 62).

Claims 11 – 19 are rejected because the apparatus necessary to accomplish the method disclosed has been rejected in claims 1 – 10, as discussed above.

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Additionally, the Examiner has responded to Applicants arguments to this same basis of rejection from the prior Examiner's action by stating:

> Applicants' arguments filed July 3, 2006 have been fully considered but they are not persuasive.
>
> Applicants contend that Kim (US 5,867,007), Lofty (US 5,850,351) and Miller (US 2005/0017654) do not combine to disclose the claimed limitations.
>
> In response to applicants' arguments regarding Kim:
>
> Kim discloses a battery management apparatus comprising two batteries of different voltages (column 1, line 63 to column 2, line 4; lines 2 – 3; column 5, lines 64 to column 6, line 5). That the batteries are not designed for use in a 42(36)V/14(12)V system is not relevant, as this specific system is not claimed in the present application. These battery levels are disclosed in the specification, but are not present in the claims. Kim also discloses how to allow the higher voltage battery to feed the lower voltage loads (column 4, lines 19 – 31) by using the DC/DC converter in the distributed management apparatus. Kim discloses sensing both a voltage drop and a voltage increase (column 4, lines 41 – 47). Lastly, Kim discloses a power generator (figure 1, item 20: column 3, lines 47 – 49). Management of the power generator into the system was not a claimed limitation in the present application.
>
> In response to applicants' arguments regarding Lofty:
>
> Lofty discloses a dual battery system, where each battery contains a monitoring module (figure, 1 items 11, 12; column 2, liens 30 – 32). The modules include a microcomputer and monitor electronic characteristics of the respective battery (column 2, lines 47 – 49). The microcomputers of each module communicate with each other through a data network (figure 1, item 15; column 2, lines 34 – 38).
>
> It is not necessary that Lofty disclose that the batteries are of different voltages, since that limitation is disclosed by Kim. Kim discloses an extra battery (figure 1, item 14), however, this battery is to supply power to an interface module (figure 1, item 13; column 2, lines 32 – 34

> and 45 – 46). This interface module, however, has no counterpart in the current application.
>
> Lastly, it is not necessary that Lofty disclose how to power lower voltage loads with a higher voltage battery, the use of a DC/DC converter to lower the voltage of the higher voltage battery, or how to incorporate a power generator into the apparatus, as each of these limitations is disclosed by Kim.
>
> In response to applicants' arguments regarding Miller:
>
> It is not relevant that Miller teaches away from using two batteries of different voltage outputs and suing a DC/DC converter, because these limitations were disclosed by Kim, as discussed above. Miller discloses a plurality of loads (paragraph 16', figure 1, item 17 – 19), where each load comprises a power distribution unit (figure 1, items 14 – 16). The power distribution units maintain an average output voltage that is within the accepted range for each load. The Miller loads are configured to operated in a 42(36)V/14(12)V system.
>
> Kim is analogous to Lofty and combine to disclose a dual-battery power supply, where each battery outputs a different voltage and comprises a monitoring module. The monitoring module detects the output of its respective battery and communicates this information to other battery monitoringmodules. The monitoringmodulesare configured to turn each battery on/off based on the sensed voltage output levels.
>
> Kim and Lofty are analogous to Miller and combine to disclose a dual-battery power supply, as discussed above, including a plurality of loads, where each comprises a power distribution unit.
>
> Therefor[e], claims 1 – 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim, in view of Lofty, and in further view of miller, as discussed below.

Applicant respectfully traverses this rejection as well as the Examiner's response to Applicants previous arguments to this same rejection earlier presented. The key to Applicants' invention is a distributedpowermanagement apparatusandmethodthat utilizes at least one lower voltage battery and one substantially higher voltage battery in cooperative combination with a DC/DC converter and multiple controllers associated with load sectors controlled by a module SMM microcontroller to provide protection

against short-circuits which cause high voltage conditions and potential for damage to the electrical system, the loads, and the possibility of fire.

A fair reading of the Kim (US 5,867,007) reference discloses distributed management apparatus to provide a selection circuit to identify and regulate a pair of same low voltage batteries, namely 5V battery packs, suitable for use in powering electronic devices such as laptop computers (see for example, Col 2, lines 35 –39 and 43 – 64). This reference does not disclose, teach, or fair suggest a distributed management apparatus that is suitable for use in a dual-voltage system having at least one lower voltage battery (12V for example) and one substantially higher voltage battery (36V for example). It also does not teach how to allow the substantially higher voltage battery to feed the lower voltage loads if necessary. It further does not disclose, teach, or fairly suggest the use of a DC/DC converter in the taught distributed managementapparatus and in fact such teaching is unwarranted as the batteries of the reference are of the same voltage 5V. Still further, it is designed to operate to identify low voltage or voltage drop, not increased voltage due to short-circuit (see for example, Col. 3, lines 1 – 5). Finally, this reference does not disclose, teach, or fairly suggest how to incorporate the management of a power generator into the system. The references cited by the Examiner in his response to prior arguments do not support his reasoning. Col. 1, line 63 to col. 2, line 4 is not a teaching of the reference but instead a discussion of one of the problems that the Kim reference is directed to overcoming. In fact, this reference is a continuation of the two paragraphs immediately preceding this referenced section and how use of multiple battery packs of the prior art have shelf life problems due to differences in battery pack cell differences (see for example, Col. 1, lines 43 – 62). The cited reference of col. 5, lines 64 to col. 6, line 5 does not discuss dual voltage battery systems either. In fact what it teaches is how to stabilize minor differences between multiple battery packs containing battery cells all having the same voltage rating. The argument that Kim discloses how to charge lower voltage batteries from substantially higher voltage batteries based on Col. 4, lines 19 – 31) is erroneous as this section of the reference in fact teaches how to supply battery output to electronic devices not among battery packs or cells within a battery pack The citation of Col. 4, lines 41 – 47 to support sensing a voltage drop or increase is only accurate within the context of the teaching of providing a stable battery pack output from multiple cells within said battery pack. The argument that

an AC/DC converter is a generator based on figure 1, item 20 and Col. 3, lines 47 – 49 is, at best, a very long stretch and does nothing to teach the claimed invention. Clearly, when viewed in this light this rejection is now moot and Applicant respectfully requests this rejection be removed.

A fair reading of the Lofty (US 5,850,351) reference discloses a distributed management apparatus for multiple cells low voltage battery packs so that all of the cells in the battery pack may be recharged optimally without damage to cells that charge at a faster rate than other cells in the battery pack (see for example, Col. 2, lines 31 – 62). As in the Kim reference, all of the cells (batteries) in a battery pack are of the same low voltage rating (see for example, Col. 1, lines 9 – 11, and Col. 2, lines 30 – 32). Further, this reference teaches the need for a separate battery to operate the claimed apparatus (see for example, Col. 2, lines 31 – 33). The Lofty reference does not disclose, teach, or fairly suggest the use of batteries having very different voltage outputs such as claimed by Applicants. This reference also does not teach the how to power lower voltage loads with a higher voltage battery if required, the use of a DC/DC converter to lower the voltage of a higher voltage battery to the voltage level of a lower voltage battery, or how to incorporate a power generator into the apparatus. The Examiner's arguments that Lofty teaches dual battery system is completely incorrect. The battery packs having multiple battery cells are all of a single voltage are combined in series to provide a single higher voltage output pack than the voltage outputs of the individual batteries comprising the pack, but these batteries are not directly supplying voltage to the loads independently, instead they simply team up in series to provide a single voltage output for the complete pack. In addition, teaching a critical element (interface module) which is not required by the claimed invention or even the other cited references clearly teaches away from the claimed invention as well as away from any combination with the Kim reference. This clearly violates the legally required need for an "impetus to combine". Thus, this reference completely fails to disclose, teach, or fairly suggest the claimed invention and in addition, completely fails to provide the necessary impetus to combine with the Kim reference. Even, if such combination was suggested, which it is not, the Lofty reference does not teach the missing parts of Kim, namely a dual voltage system, charging a lower voltage battery from a substantially higher voltage battery, and how to incorporate a

generator into the Kim reference. Clearly, when viewed in this light this rejection is now moot and Applicant respectfully requests this rejection be removed.

A fair reading of the Miller (US 2005/0017654) reference discloses a single higher voltage battery (42/36V) suitable for powering both higher voltage (36V) loads as well as lower voltage (12V) loads (see for example paragraph [0014]). It discloses, teaches, and fairly suggests that using at least two batteries of different voltage outputs (see for example, paragraph [0003], and using a DC/DC converter (see for example, paragraph [0006]) is not suitable. That is, this reference teaches directly away from Applicants' claimed invention. Further, this teaching is one of using a power generator in the apparatus which is completely unsuitable for combining with the Kim or Lofty references. Clearly, this reference is not combinable with the Kim or Lofty references teaching low voltage 5V battery chargers or multiple like low voltage battery use for electronic devices. All three references lack the legally necessary impetus within any of the cited references to suggest to one of ordinary skill in the art the desirability of combining the teachings of these references to arrive at Applicants' claimed invention. In fact, the Miller reference teaches directly away from Applicants' claimed invention. Thus, these references are not combinable as suggested by the Examiner and even if they were combinable do not disclose, teach, or suggest Applicant's claimed invention. The Examiner's argument that the Miller reference teaches a plurality of loads and such loads are power distribution units based on figure 1, items 14 – 16 is incorrect. Firstly, Miller teaches that a single substantially higher voltage system (for example 42V) is preferred over a dual voltage system (see for example, paragraph [0003]. Further Miller teaches that DC/DC converters are to be avoided (see for example, paragraph [0006]. In fact what Miller teaches is a means of using a single 42V system to power both 42V and 14V lighting systems by utilizing a pulse-width modulation (PWM) system to provide power to the 14V lighting system without burning it out by overloading (see for example, paragraph [0008]. Thus, it is teaching how to provide both lower voltage and substantially higher voltage from a single substantially higher voltage battery. That is a single battery system to feed a dual voltage electrical system. Clearly, when viewed in this light this rejection is now moot and Applicant respectfully requests this rejection be removed.

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In view of the remarks herein, and the amendments hereto, it is submitted that this application is in condition for allowance, and such action and issuance of a timely Notice of Allowance is respectfully solicited.

Respectfully submitted,

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